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September 22, 1995

Ms. Lisa Green, Director
Environmental Restoration Division
U.S. Department of Energy
785 DOE Place
Idaho Falls, ID 83401-1562

RE: Post-Record of Decision Monitoring for the Test Reactor Area Perched Water System Operable Unit 2-12, Second Annual Technical Memorandum

Dear Ms. Green:

We have reviewed the above referenced document, on the basis of our evaluation of the information presented in this Technical Memorandum, we believe the monitoring program outlined in the Record of Decision should continue to be implemented.

If you have any questions or would like clarification on the comments provided, please contact Wayne Pierre at (206) 553-7261.

Sincerely,

Linda Meyer

Linda Meyer
WAG 2 Remedial Project Manger

cc: Jean Underwood, IDHW
Nolan Jensen, DOE-ID

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POST-RECORD OF DECISION MONITORING
FOR THE TEST REACTOR AREA PERCHED WATER SYSTEM,
OPERABLE UNIT 2-12, SECOND ANNUAL TECHNICAL MEMORANDUM

GENERAL COMMENTS

The basis for reducing monitoring of the deep perched water is not sufficient at this time. With concentrations of tritium in the deep aquifer increasing, quarterly data should be collected to assist in understanding the system. In the 3 year summary report, trends should be established for the deep perched zone (DPWS) and the Snake River Plain Aquifer (SRPA) for each well. At wells having a long sampling history, a recent-year trend (perhaps post-1990) may be compared to the historic trend (pre-1990). In some cases, nonlinear regression analysis may be more appropriate for analyzing historic and post-ROD monitoring data because the entire data set may no longer fit a linear model.

The recommendation to add SRPA well TRA-8 is justified; this well should be included in the next round of SRPA sampling. The recent-year (post-1990) data from SRPA wells USGS-65 and USGS-58 show either stabilization or an increase of tritium and chromium. Sampling at a downgradient location becomes necessary to monitor any migration (or expansion) of the contaminant plumes in the SRPA.

The United States Geological Survey (USGS) DPWS and SRPA monitoring network appears to be complementary to the OU 2-12 post-ROD monitoring program, and use of both OU 2-12 and USGS data is appropriate (especially for the water level analysis and contaminant area plots in this report). Some USGS contaminant concentration data, if available, should be used as well for the trend analysis. For example, concentrations of some key contaminants (tritium and chromium) at other SRPA wells such as USGS-79, USGS-76, and the upgradient wells, could be plotted over time. The new analysis of USGS data should be included in the future 3-year data evaluation report.

The recommended change of the DPWS well sampling frequency from quarterly to semiannually (except USGS-53) should be postponed until the 3-year data are collected and the data fully evaluated because:

- Contaminant concentrations still vary considerably at some DPWS well locations. Definite trends for most contaminants monitored have not been established for the last 2 years (post-ROD period). The impact on the DPWS of the reduction of contaminants discharged to the subsurface from discontinuous operation of the warm waste ponds is not fully understood.

- The study of water level patterns in the DPWS indicates that discharge from the cold waste water ponds is the dominant factor in the head fluctuations and possibly the lateral extent of the DPWS. Infiltration from the cold wastewater ponds may affect contaminant concentrations by: (1) continuing to flush/leach (desorb) the contaminants adsorbed in the overburden and vadose zone sediments; and (2) mixing with the DPWS as a dilution water source. The current contaminant concentrations in the DPWS show that dilution may not be effective yet. However, it is important to continue monitoring the DPWS contaminant concentrations along with pond discharges and the DPWS head patterns at the current frequency to verify the leaching/dilution hypothesis.

- Variations in contaminant concentrations in the DPWS may be linked to variations in the cold wastewater pond discharge rate, seasonal natural water infiltration rates and the head patterns of the monitoring wells. These relationships have not been fully explored and evaluated. The continued collection of quarterly data for another year and evaluating the 3-year discharge, head, and concentration data may help to characterize and predict trends in DPWS contaminant concentrations.

- Meaningful upper tolerance limits (UTLs) and trends in concentration changes have not been established for wells PW-11 and PW-12 because sufficient data have not been collected in the past. Quarterly sampling at these wells is appropriate because two more data points will be available at the end of the 3-year monitoring (quarterly versus semiannually), which may make the statistical analysis of the data more accurate and meaningful.

Some of the conclusions in this report regarding contaminant concentration trends should be further evaluated. For example, chromium concentrations in well USGS-53 and 55 are said to be either changing insignificantly or decreasing. Using the plots shown in Appendix D, however, this conclusion is not apparent. This concern is discussed further in the following specific comments.

SPECIFIC COMMENTS

Section 3.4, page 14, last paragraph and page 15, Figure 10

The head patterns of three wells (USGS-68, USGS-72, and PW-12) in the northwest portion of the DPWS, with hydrographs and cold wastewater ponds discharge rates, are shown in Figure 10. Wells USGS-62, -66, and -71, which are located in the southeast portion of the DPWS, have similar patterns, and should be discussed as well, with hydrographs developed. These wells are a similar distance from the cold wastewater ponds as the northwest wells, which indicates that the spreading of the DPWS from recharge of the cold wastewater ponds is less effective in the northwest-southeast direction than in the northeast-southwest direction.

Section 4.2, page 20, last paragraph

This paragraph states that the water elevation at well USGS-65 (2 feet higher than at nearby wells) is influenced by recharge from the cold wastewater ponds via the DPWS. This can be misleading because other wells may be influenced by the same recharge source, even though the head elevation may be lower than USGS-65. Well USGS-65 is completed in the uppermost fracture zone of the SRPA; the difference in water heads reflects a downward vertical gradient at this location. This downward gradient may extend beyond the test reactor area where any direct impact from infiltration of the DPWS may not be obvious. The text should emphasize that the head difference is caused by the aquifer vertical heterogeneity and well completion depth.

The text also states that the head patterns may be indicative of vertical mixingY of contaminants. This can be confusing because it is not clear whether the vertical mixing referred to here is the actual contaminant mixing in the SRPA or the mixing of water from different fracture zones in the sampling well because of the large well intake (screening) length (dilution effect). Vertical migrationY may be a better term for the aquifer mixing. In the case of contaminant vertical mixing in the SRPA, hydrostratigraphic features (such as the sedimentary layer below well USGS-65) are indicators of possible inhibited vertical migration. In the case of water mixing in wells, well completion and the hydraulic conductivities of different zones determine the effect. Head pattern at a well may or may not reflect vertical mixing.Y The text should be modified accordingly.

Section 4.3, pages 22 and 23

The SRPA well completion may contribute to the variations in contaminant concentrations. The information in this section (well completion) is important for an appropriate evaluation of the chemical data. Concentration data should be included in Table 2 and concentrations plotted against sampling interval or sampling depth.

Section 4.5, page 25

The statement "Heads in well USGS-65 suggest a local system where mixing with deeper aquifer is inhibited" should read "Heads in well USGS-65 reflect a downward vertical gradient in the upper portion of the SRPA at that location; the underlying sedimentary layer may inhibit direct hydraulic connection to the lower zones."

Section 5.3.1, pages 26, last paragraph (continued on page 27)

The text states that concentrations of arsenic and tritium were observed to be decreasing, and that no significant trends were observed for any other contaminants at well USGS-53. This statement is not supported by the data plots presented in

Appendix D. First, the arsenic concentration trend is based on first-year data. When second year data are added (a total of eight data points), arsenic at well USGS-53 appears to be stabilizing (Note: the duplicate results reflect variations in laboratory analysis, and should not be included as one data point in the trend analysis or any statistical analyses). Second, chromium concentrations (total and hexavalent) at well USGS-53 appear to be increasing. The conclusion of no significant trend should be revisited, and the trend in chromium concentrations at well USGS-53 should be identified in the future (3-year) report. In addition, strontium-90 concentrations at USGS-53 have been increasing since October 1994. An increasing trend will be demonstrated if strontium-90 is found at the same level or higher in the next four sampling rounds.

Section 5.3.1, page 27, first full paragraph

The text mentions the baseline and recalculated UTLs. It is not clear how the two UTLs are recalculated (i.e., whether different data sets were used). This should be clarified in the text. Also, the recalculation of the UTL should be explained.

Section 5.3.3, page 27

The text states that a decreasing concentration trend was observed for chromium in well USGS-55. This can be concluded if the complete data record (from 1982) is considered. However, the data show that chromium concentrations have not decreased significantly since 1990. Data from 1990 may be more representative of a scenario of flushing/leaching from the overburden and vadose zone sediments (rather than well injection and wastewater infiltration). In this scenario, concentrations may vary with fluctuations of the cold wastewater pond discharge and water head. A plot of discharge rate, head, and concentration may be useful for the data analysis. For a statistical trend analysis, a nonlinear regression may be used. Statistical tests can be used to determine whether linear or nonlinear regressions are more appropriate for the data.

Section 5.3.5, page 27

Contaminants at the SRPA well USGS-58, other than tritium, have not been subject to a trend analysis. However, historical data on chromium concentrations (total?) are available. With the exception of two outliers shown in 1985, chromium concentrations at well USGS-58 are generally stable. Therefore, without a quantitative regression analysis, it can be concluded that chromium concentrations at well USGS-58 are stable. This should be explained in the text.

Section 5.3.6, page 27, last paragraph

The report states that both tritium and chromium have been decreasing at well USGS-65. The four rounds of the post-ROD sampling results for these two contaminants show that the previous decreasing trends (pre-ROD) may gradually change. The previous linear regression line may no longer fit the recent-year data. Two options may be applied for the future 3-year post-ROD data analysis: (1) a new linear regression analysis based on the recent-year data (perhaps 1990 to 1996) to identify a new trend, which may represent the contaminant concentration changes after mass injection directly to the aquifer, and (2) a nonlinear regression analysis to identify an overall trend using all the data.

Section 5.4, page 28, third paragraph

The text states that only two deviations were noted between pre-ROD and initial post-ROD trends. Chromium in well USGS-55 is identified as having a significantly decreasing trend, and tritium in well USGS-58 is said to be increasing. While tritium does appear to be increasing at well USGS-58, it does not appear that chromium is decreasing significantly at well USGS-55. The chromium concentrations have been fluctuating for the last ten years but have not decreased significantly since 1986. If the last 9 years' data are used for the regression analysis, the trend will differ significantly from that shown using the complete set of pre- and post-ROD data.

In addition, the post-ROD data show that the contaminant concentrations in the DPWS wells fluctuated considerably and that concentrations of tritium and chromium in the SRPA wells stabilized or increased slightly (tritium in USGS-58). The concentrations in the DPWS wells may reflect the impact of water discharge to the cold wastewater ponds and head pattern in the wells; the concentration in the SRPA wells may indicate that the decreasing trend is slowing down or reaching equilibrium with continuing contaminant loading from the DPWS. Statements that no trend is observable or that there is a decreasing trend should be more thoroughly evaluated.

Section 6.3, Figure 23, page 32

In this "bubble" graph, certain areas of the circles represent certain concentrations at different locations. However, squares are also used in the figure, and it is difficult to compare areas of squares to areas of circles. The figure should be modified to make the comparison easier. This comment also applies to Figure 29 on page 35.

Section 6.3, page 33, first paragraph

The text states that the recently lowered water flow rate (to the cold wastewater ponds?) may contribute to higher chromium concentrations at well USGS-53. This has not been substantiated. Plots of discharge rates, hydrographs, and concentrations of chromium should be shown on one figure to facilitate an evaluation of this hypothesis.

Section 7, page 37, last bullet, and page 38, last bullet

Chromium is one of the key contaminants identified at OU2-12. Its concentration trends in the SRPA at various locations should be more thoroughly evaluated as discussed earlier. More detailed analysis can be performed after another two rounds of samples are collected during post-ROD monitoring year three. The discussion in the report should then be modified accordingly. The same concern applies to tritium concentrations. If an increase in tritium at well USGS-58 is confirmed by the further analysis, while tritium is deceasing or remaining stable elsewhere, this should be characterized and explained.

Sections 9 and 10, pages 41 and 42

OU-12 post-ROD groundwater monitoring is discussed in the general comments. These sections may require modification if agreement on changes in the monitoring program is reached.

Appendix B, Groundwater Head Plots for wells USGS-55 and -56

It appears that no water level data were collected for these two wells between July 1993 and April 1994. During this period, a peak in water head was observed at most other DPWS wells. The lines connecting the two data points (July 93 and April 94) in these two hydrographs should be deleted or dashed lines used to indicate breaks in data collection. This will make these two hydrographs comparable to the others and avoid misinterpretation of the data.

Appendix D, Data Plot for Arsenic at well USGS-53

The linear regression line and the UTL line were calculated based on the first-year data only (four data points). This trend line should be deleted, and a new regression analysis and UTL calculation should be done for the 2-year data (eight total data points). The trend discussion based on the four-data-point regression analysis is not valid. Further, duplicate data should not be included for any statistical analysis because this doubles the accounting of one sampling event.